

## **REMARKS**

In response to the above-identified Office Action ("Action"), Applicant traverses the Examiner's rejection of the claims and seeks reconsideration thereof. Claims 1-10 are pending and claims 11-16 are withdrawn. In this response, no claims are amended, no claims are cancelled and claims 17 and 18 are added.

### **I. Examiner Interview Summary**

Applicant respectfully acknowledges with appreciation the Examiner's time and consideration of the instant application during the Examiner Interview on February 12, 2008 via telephone with Applicant's representative. During the interview the rejections raised in the Office Action mailed November 13, 2007 and in particular the rejections of claim 1 in view of USPN 4132104 were discussed. Applicant's representative discussed with the Examiner the meaning of the phrase composite reinforced pipe as it is understood in the art and in view of Applicant's specification. The Examiner suggested Applicant clarify what is meant by this language by amending the claims and/or submitting further evidence as to the commonly understood meaning of this language in the art. No agreements were reached during the interview.

### **II. Claim Amendments**

Applicant respectfully submits herewith new claims 17 and 18. New claims 17 and 18 add the elements of the composite reinforcement of the CRP comprising a resin matrix with circumferential and longitudinal reinforcement fibers (claim 17) wherein the number of longitudinal fibers is greater than the number of circumferential fibers (claim 18). Support for new claims 17 and 18 may be found, for example, on page 5, paragraph [0015] of the Application. Applicant respectfully submits the elements of new claims 17 and 18 are not new matter and are supported by the specification. Accordingly, Applicant respectfully requests consideration and entry of new claims 17 and 18.

### **III. Claims Rejected Under 35 U.S.C. §102**

In the outstanding Action, claims 1-4, and 7 are rejected under 35 U.S.C. §102(b) as being anticipated by U. S. Patent No. 4,132,104 issued to Clavin ("Clavin"). Applicant respectfully traverses the rejection for at least the reasons set forth below.

It is axiomatic to a finding of anticipation that each and every element of the rejected claim be found within a single prior art reference.

With respect to claim 1, Applicant respectfully submits that Clavin fails to teach “[a] method of bending a Composite Reinforced Pipe (CRP)” including the elements of “heating the pipe” and “bending the pipe at the longitudinal location” as recited in claim 1.

The Examiner alleges “applying a material to a pipe” as recited in col. 4, lines 43-59 of Clavin teaches a composite reinforced pipe and further that col. 1, line 57-col. 2, line 5 and Figure 1 teach heating the pipe prior to bending. See Action, page 2. The Examiner alleges that merely applying a material to a pipe teaches a composite reinforced pipe because a composite is something made up of distinct parts i.e. a pipe and coating. See Action, page 2. In reaching this conclusion, however, Applicant believes the Examiner misinterprets the phrase composite reinforcement as it is used in the context of the instant application and claims.

In particular, one of ordinary skill in the art would understand that the phrase “composite reinforced pipe” refers to a pipe having a composite reinforcement attached thereto. Not simply a pipe with a plastic coating because a plastic coating may not be characterized as a composite reinforcement. A composite reinforcement is well understood in the art to refer to a matrix material, such as a resin, which is reinforced with another material, for example, fibers such as fiberglass. See, for example, page 1, paragraph [0003] of the Application. As further evidence of this definition, Applicant directs the Examiner’s attention to the Application, and in particular pages 4-5, paragraph [0014], in which a “composite reinforcement” is described as being made of a resin matrix and reinforcement fibers. Finally, Applicant directs the Examiner’s attention to the document titled “Introduction to Composite Materials” found at [http://www.efunda.com/formulae/solid\\_mechanics/composites/comp\\_intro.cfm](http://www.efunda.com/formulae/solid_mechanics/composites/comp_intro.cfm) and further

attached herewith for the Examiner's convenience. Composite materials are further described in this document as a material composed of a reinforcement embedded in a matrix. Nowhere within Clavin is it disclosed that the plastic surrounding the pipe includes any sort of reinforcement material. Thus, neither a plastic coating alone nor a plastic coated pipe as disclosed in Clavin may be characterized as a composite reinforcement as alleged by the Examiner. Thus, for at least the foregoing reasons Clavin fails to teach a method of bending composite reinforced pipe as recited in claim 1.

Moreover, col. 1, line 57-col. 2, line 5 of Clavin fails to teach heating of the pipe prior to bending as alleged by the Examiner. See Action, page 2. Instead, this portion of Clavin teaches that "*the pipe coating at the outside of the bend is heated directly* by resistance heating apparatus disposed at a specific area" (emphasis added). In addition, Clavin discloses that the coating is to be "*rapidly heated.*" See Clavin, col. 1, line 64. The Examiner alleges that Clavin would necessarily heat the pipe at least by conduction through their interfaces. See Action, page 7. Applicant respectfully submits, however, that in as much as the coating may be heated so rapidly that it is not heated all the way through to the pipe, a direct heating method for a coating such as that disclosed in Clavin does not necessarily teach the method of bending recited in claim 1 wherein *the pipe is heated*.

Thus, for at least the foregoing reasons, Clavin fails to teach a method of bending a composite reinforced pipe wherein the pipe is heated as recited in claim 1. Since each and every element of the claim is not taught by the reference, anticipation may not be found. In view of the foregoing, Applicant respectfully submits claim 1 and its dependent claims 3, 4 and 7 are patentable over Clavin and requests the rejection of claims 1, 3, 4 and 7 under 35 U.S.C. §102(b) as being anticipated by Clavin be withdrawn.

In regard to dependent claim 2, claim 2 depends from claim 1 and incorporates the limitations thereof. Thus, for at least the reasons discussed in regard to claim 1, Clavin fails to anticipate Claim 2.

In addition, the failure of Clavin to teach a CRP and heating the pipe as recited in claim 1 necessarily prevents Clavin from teaching the element of “wherein the pipe is heated such that a composite temperature is slightly below a heat distortion temperature of the composite” as further recited in claim 2.

The Examiner alleges Clavin discloses a heating temperature which softens the coating without destroying it in col. 4, lines 65-col. 5, line 2 and therefore teaches this element. See Final Action, page 6. This portion of Clavin generally discloses that a preferred heating temperature will be in a range where the coating is softened without deforming or destroying the coating. See Clavin, col. 4, lines 65-68. This portion of Clavin does not specifically disclose what the preferred temperature range is.

It is well known that a heat distortion temperature of a material refers to a temperature at which the material deforms under a specific load and is determined by standardized testing procedures. Applicant respectfully submits herewith a document titled “Deflection Temperature Testing of Plastics” (“the HDT paper”) which can also be accessed at <http://www.matweb.com/reference/deflection-temperature.aspx> pursuant to the Examiner’s request in the Action that Applicant provide evidence of the meaning of heat distortion temperature. See Action, page 7. As is evidenced from the listing of various heat distortion temperatures on pages 1-2 of the HDT paper, the heat distortion temperature of a material is specific to that material and is determined by more than a mere softening of the material. Accordingly, an undisclosed temperature range which softens a plastic does not teach a temperature below a heat distortion temperature of a composite as required by claim 2.

Moreover, the exemplary temperatures for heating the plastic coating recited in col. 4, lines 60-65 of Clavin are significantly higher than the HDT of a typical epoxy plastic such as that disclosed in Clavin. In particular, an epoxy plastic such as polyethylene terephthalate (PET) has a heat distortion temperature of 65 and 70 degrees Celsius depending upon the load applied. See HDT paper, page 2, listing HDT for (PET). Thus, heating the plastic coating disclosed in Clavin to temperatures of from 121 degrees Celsius to 205 degrees Celsius, temperatures which are

almost twice the presumed HDT of the disclosed plastic, does not teach heating a pipe such that the composite reinforcement temperature is slightly below the HDT of the composite as claimed.

In addition, Clavin teaches heating the coating directly. Thus, Clavin further fails to teach heating a composite *via an underlying pipe* to a temperature below a heat distortion temperature of the composite as recited in claim 2.

Since Clavin fails to teach at least this additional element of claim 2, anticipation may not be established. For at least the foregoing reasons, Applicant respectfully submits claim 2 is not anticipated by Clavin and requests the rejection of claim 2 under 35 U.S.C. §102(b) over Clavin be withdrawn.

#### **IV. Claims Rejected Under 35 U.S.C. §103**

A. In the outstanding Action, claims 5 and 6 are rejected under 35 U.S.C. §103(a) as being unpatentable over Clavin as applied to claims 3 and 4, and further in view of European Patent Application 1 086 760 A2 by Lewis ("Lewis"). Applicant respectfully traverses the rejection for at least the reasons set forth below.

To establish a *prima facie* case of obviousness, the Examiner must set forth "some articulated reasoning with some rational underpinning to support the conclusion of obviousness." See KSR International Co. v. Teleflex Inc., 82 USPQ2d 1385, 1396 (2007). In combining prior art elements to render the claimed combination of elements obvious, the Examiner must show that the results would have been predictable to one of ordinary skill in the art. See Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103, Section III(D), issued by the U.S. Patent and Trademark Office on October 10, 2007.

Claims 5 and 6 depend from claim 1 and incorporate the limitations thereof. As previously discussed in regard to claim 1, Clavin fails to teach at least the elements of a composite reinforced pipe and heating and bending the pipe as further incorporated into claims 5 and 6 from claim 1. The Examiner has further not pointed to, and Applicant is unable to discern,

a portion of Clavin or Lewis disclosing or rendering predictable these elements. Thus, for at least the foregoing reasons, claims 5 and 6 are not *prima facie* obvious over Clavin and Lewis.

Claim 5 is further not obvious over Clavin in view of Lewis for at least the reasons that Clavin and Lewis fail to disclose or render predictable the element of “wherein the longitudinally displaced locations are separated by a distance equal to approximately 1/4 of a diameter of the pipe” as further recited in claim 5.

The Examiner alleges Clavin teaches 1 degree bends achieved in an arc distance equal to a pipe’s diameter and Lewis discloses spaced ¼ degree bends. See Final Action, page 3. The Examiner alleges the foregoing disclosures teach spaced ¼ degree bends which are ¼ of the 1 degree arc length and therefore meet the limitations of claim 5. See Final Action, page 3. Applicant respectfully disagrees.

In particular, although Clavin discloses bending the pipe 1 degree per arc foot in col. 5, a mere teaching of a pipe bend degree per arc foot does not disclose longitudinally spacing the bends along the pipe based on a diameter of the pipe. Similarly, the portion of Lewis relied upon by the Examiner describes over bending of the pipe to ½ degree instead of ¼ degree to achieve a ¼ degree bend once the pipe is relaxed, not spacing bends along the pipe. See Lewis, col. 9, paragraph [0029]. Thus, these portions of Clavin and Lewis are concerned with the angle of the pipe bend, not where the bend is positioned along the pipe with respect to a pipe diameter. The degree of bend is not what is recited in claim 5. Rather claim 5 specifies that the distance between longitudinally displaced locations along the pipe is ¼ of a diameter of the pipe. Accordingly, for at least these additional reasons the Examiner fails to identify a portion of either Clavin or Lewis disclosing or rendering predictable at least the element of longitudinally displaced locations separated by a distance equal to approximately ¼ of a diameter of the pipe.

Since Clavin and Lewis, alone or in combination, fail to disclose or render predictable each and every element of claims 5 and 6, a *prima facie* case of obviousness may not be found. For at least the foregoing reasons, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 5 and 6 under 35 U.S.C. §103 as obvious over Clavin and Lewis.

**B.** In the outstanding Action, claims 8 and 10 are rejected under 35 U.S.C. §103(a) as being unpatentable over Clavin as applied to claim 1, and further in view of U. S. Patent No. 4,255,378 issued to Miller et al ("Miller"). Applicant respectfully traverses the rejection for at least the reasons set forth below.

Claims 8 and 10 depend from claim 1 and incorporate the limitations thereof. As previously discussed in regard to claim 1, Clavin fails to disclose or render predictable at least the elements of a CRP and heating and bending the pipe as further incorporated into claims 8 and 10 from claim 1. The Examiner has further not pointed to, and Applicant is unable to discern a portion of Miller curing the deficiencies of Clavin with respect to at least these elements.

In addition, there is no reason to modify Clavin in view of Miller to include the elements of "capping the pipe to prevent heat loss" (claim 8) and preheating the pipe by "introducing hot air into the CRP" (claim 10). As previously discussed, Clavin discloses a technique for bending a *metal* pipe without tearing a coating by *directly* heating the coating. Clavin does not contemplate *heating the pipe* prior to bending of the pipe as a way to prevent tearing of the coating much less a desire to retain heat within the pipe.

Miller discloses a process for bending a *plastic* pipe wherein air is retained within the pipe using plugs at each end *so that pressurized air is trapped within the pipe to prevent pipe buckling during bending*. See Miller, col. 5, lines 22-29.

Nowhere within Miller is it contemplated that the trapped air facilitates heating of a coating or prevents tearing of an outer coating during bending of the pipe. Moreover, the reason for trapping pressurized air using plugs as disclosed in Miller (i.e. prevent buckling of plastic pipe during bending) is entirely absent in Clavin. In particular, Clavin discloses a metal pipe. One of ordinary skill in the art would not understand trapping of pressurized air within a metal pipe to have any particular advantage with respect to pipe buckling. Accordingly, one of ordinary skill in the art would not understand any reason to introduce hot air into the metal pipe of Clavin or cap off the pipe ends to prevent heat loss.

Thus, for at least the foregoing reasons, the combination of Clavin and Miller may not be relied upon to disclose or render predictable each and every element of claims 8 and 10. Since each element of the claims is not provided by the references, a *prima facie* case of obviousness may not be found. Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 8 and 10 under 35 U.S.C. §103 as obvious over Clavin and Miller.

C. In the outstanding Action, claim 9 is rejected under 35 U.S.C. §103(a) as being unpatentable over Clavin as applied to claim 1, and further in view of U. S. Patent No. 2,480,774 issued to Rossheim ("Rossheim"). Applicant respectfully traverses the rejection for at least the reasons set forth below.

Claim 9 depends from claim 1 and incorporates the limitations thereof. As previously discussed in regard to claim 1, Clavin fails to disclose or render predictable at least the elements of a CRP and heating and bending the pipe as further incorporated into claim 9 from claim 1. The Examiner has further not pointed to, and Applicant is unable to discern a portion of Rossheim disclosing or rendering predictable at least the element of a CRP.

In addition, the combination of Clavin and Rossheim may not be relied upon to disclose or render predictable at least the element of "an induction heater" as further recited in claim 9. The Examiner alleges it would be obvious to incorporate an induction heater such as that of Rossheim into Clavin because both resistance and induction heaters are capable of heating a pipe to be bent. See Action, page 5.

As can be seen from Figures 1 and 4 of Rossheim, the disclosed heaters are relatively bulky devices which include ring like openings through which the pipe can be inserted for heating. In contrast, the heating element of Clavin is a thin sheet like strip designed to be inserted within a recess along an upper surface of a strongback which extends along a length of the pipe. See Clavin, col. 3, lines 5-40. Thus, the heating element is sandwiched between a portion of the pipe and strongback. A bending die is further positioned along a side of the pipe opposite the strongback to facilitate bending. See Clavin, Figure 1. The pipe is then bent by rotating the strongback with the heating element therein. See Clavin, Figure 1. In this aspect,



heating of the coating and bending of the pipe occur simultaneously thereby preventing tearing of the coating.

Applicant recognizes that the test for obviousness includes a consideration of what the prior art would have suggested to one of ordinary skill in the art as pointed out by the Examiner on page 8 of the Action, however, upon review of the heating techniques and devices disclosed in Rossheim and Clavin one skilled in the art would not understand to combine them. In particular, one of ordinary skill in the art would recognize that even if it were possible to modify Clavin as proposed by the Examiner, such modification would require a significant structural change to Clavin and bending of the pipe while heating the coating within the bend as provided by the system in Clavin could not be achieved. In particular, since the heating element of Rossheim encircles the pipe, if it were used in Clavin it would need to be placed on either side of the strongback and could no longer be positioned along a pipe section within the bending apparatus. Thus, it would be uniquely challenging and would frustrate the purpose of Clavin to incorporate the heating devices of Rossheim into Clavin. Accordingly, for at least the foregoing reasons, the combination of Clavin and Rossheim may not be relied upon to disclose or render predictable an induction heater as recited in claim 9.

Since the combination of Clavin and Rossheim may not be relied upon to disclose or render predictable each and every element of claim 9, a *prima facie* case of obviousness may not be established. Applicant respectfully requests reconsideration and withdrawal of the rejection of claim 9 under 35 U.S.C. §103 as obvious over Clavin and Rossheim.

#### **V. New Claims 17 and 18**

Claim 17 depends from claim 1 and incorporates the limitations thereof. Claim 18 depends from claim 17. Thus, for at least the reasons that claim 1 is not anticipated by or obvious in view of Clavin, Lewis, Miller or Rossheim, alone or in combination, claims 17 and 18 are patentable over the cited prior art. In addition, claim 17 recites the element of “wherein a composite reinforcement of the CRP comprises a resin with circumferential and longitudinal reinforcement fibers positioned along the pipe.” Claim 18 recites the element of “wherein the

number of longitudinal fibers is greater than the number of circumferential fibers.” Nowhere within Clavin, Lewis, Miller or Rossheim is the claimed composite reinforcement disclosed. As previously discussed, the reference relied upon by the Examiner to disclose a CRP, namely Clavin, discloses a resin or plastic coating. A resin or plastic coating may not be characterized as a composite reinforcement comprising reinforcement fibers running in a substantially longitudinal direction of the pipe as claimed. Thus, for at least the foregoing reasons, Applicant respectfully requests consideration and allowance of claims 17 and 18 at the Examiner’s earliest convenience.

### **CONCLUSION**

In view of the foregoing, it is believed that all claims now pending are now in condition for allowance and such action is earnestly solicited at the earliest possible date. If there are any additional fees due in connection with the filing of this response, please charge those fees to our Deposit Account No. 02-2666. Questions regarding this matter should be directed to the undersigned at (310) 207-3800.

Respectfully submitted,

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### **CERTIFICATE OF TRANSMISSION**

I hereby certify that this correspondence is being submitted electronically via EFS Web to the United States Patent and Trademark Office on February 13, 2008.

  
Si Vuong